

sias or hyperesthesia occurs in a specific dermatome or dermatomes; straight-leg raising is restricted, preferably less than half of normal; weakness, atrophy, sensory changes, or reflex alteration is demonstrated in a lower extremity; and the findings of computed tomography, myelography, or magnetic resonance imaging correlate with clinical findings.

Absolute contraindications include causes of symptoms such as tumor, infection, spondylolisthesis, or congenital abnormalities; sequestration or a free fragment; foraminal stenosis; and severe facet arthropathy. Relative contraindications are back pain without sciatica, previous chymopapain injection at the same level, stenosis or facet arthropathy with disc protrusion, multiple levels, and internal disc derangement. These relative contraindications constitute a "gray zone" for surgeons.

The procedure is done with either manual instruments, such as pituitary rongeurs, or an automated suction aspiration probe called the nucleotome. The procedure consists of inserting a cannula through a small incision down to the annulus by a posterolateral approach. This avoids entering the spinal canal and injuring its contents. The instrument—rongeur or nucleotome—is then inserted into the disc for the removal of nucleus pulposus material. Positioning of the instruments is carefully monitored by fluoroscopy throughout the procedure.

The following five criteria should be met for the procedure to be considered a success: no further intervention is needed; radicular pain has moderately or totally improved; postoperative function has improved; no need for narcotic analgesics exists; and both patient and surgeon are satisfied.

The percutaneous discectomy procedure is a safe and well-tolerated alternative to laminectomy with discectomy or chemonucleolysis in patients meeting the selection criteria. With these patients, it is reasonable to expect a success rate in the range of 70% to 75%.

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Objective Measurements for Rehabilitation After Back Injury

WE NEED OBJECTIVE MEASUREMENTS of spinal function after back injury to know if a patient is improving with treatment or has reached a plateau. Once a plateau has been reached with an exercise program, the level of impairment can be identified and job readiness established.

There are two important elements to measure: range of motion and muscle performance. In the lumbar spine, the spinal range of motion is difficult to separate from hip range of motion. Pelvic rotation must be separated from lumbar motion. The current American Medical Association guidelines recommend the use of two inclinometers to identify true lumbar range and the range of the thoracic or cervical spine.

An array of computerized devices to measure range and strength has entered the marketplace. The most accurate measurements can be obtained when the equipment can isolate spinal segments as well as stabilize the pelvis. One system collects data simultaneously along three axes—flexion-extension, rotation, and lateral bend. This device monitors both speed and strength. Strength screening can be accomplished on the equipment at variable speeds. At present, there is no evidence that exercise training at various speeds offers an advantage for muscle strengthening.

The controlling of speed during testing is known as isokinetics. If speed is controlled by the equipment when the patient is tested, high-impact forces occur as the patient tries to make the machine move faster. Isokinetic testing is dynamic testing, and thus gravity and inertia must be controlled for. Comparisons among populations of patients are not always accurate and reliable.

In addition to the variable-axes and the speed-controlled equipment, a third method of measuring range and muscle performance of the spine is available. This equipment measures isometric strength at various equidistant points along the arc of available range. To evaluate spinal function only, the spine is isolated from the pelvis and extremities when the patient sits in the equipment. Strength training through slow variable-resistance exercise in a concentric and an eccentric mode is also available. Function measured in this manner is the most accurate, and strength training is the most efficient.

Range and muscle strength can now be tested with commercially available computerized equipment. Valid results are variable for most equipment, but experience has shown that measuring function rather than documenting pain allows the best opportunity for an efficient rehabilitation program.

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